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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/075,193 | 02/13/2002 | Shenlin Chen | MI22-1927 | 8017 |

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[REDACTED] EXAMINER

HUYNH, YENNHU B

| ART UNIT | PAPER NUMBER |
|----------|--------------|
| 2813 | [REDACTED] |

DATE MAILED: 06/04/2003

12

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/075,193 Examiner Yennhu B Huynh | Art Unit 2813 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 12 March 2003.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 42-48 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 42-48 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>10</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to the Amendment filed on 3/12/03.

Applicant's election without traverse of claims 42-48 Paper No. 8 is acknowledged.

Claims 1-41, 49-60 and 61-73 have been canceled filed on 2/13/02 , 8/30/02 and 11/20/02.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 42-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Al-Shareef et al. (U.S. 6,111,285) in view of Thakur (U.S. 6,255,159B1).

Al-Shareef et al. disclose a capacitor in DRAM, which include:

-Re. claim 42: forming a container struction comprising a first silicon containing layer and a second silicon containing layer 152; wherein the first silicon containing layer being more heavily doped with conductivity enhancing dopant than the second silicon containing layer; the second silicon containing layer defining an inner periphery of the container and the first silicon containing layer defining an outer periphery of the container; converting at least some of each of the first and second silicon containing layers to HSG silicon (col.4, lines 3-15); forming a dielectric material layer 154; forming a conductive material layer 156 over the dielectric material, the container struction and conductive material together defining capacitor structure. (fig.8, lines 16-43).

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However, Al-Shareef et al. do not disclose the different HSG size from the first and the second silicon layer.

Thakur in related art disclose a method to form HSG, which include a various application and modification can be made to seeding, forming grain size, and lower or higher rugged surface can be controlled by gas processing, concentration of dopant, and selecting of any order of mixing ingredients (col. 3 & 4, lines 65-19).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Al-Shareef et al. by incorporating the forming of different HSG sizes to maximizing the capacitance per cell area.

Al-Shareef et al. also disclose:

-Re. claim 48: wherein the second silicon containing layer is substantially undoped (col.4, lines 10,11).

Al -Shareef et al. also do not disclose wherein the converting comprises silane gas and anneal the seeded layer at temperature about 550 C degrees, under 1×10^{-4} Torr, to about 3 minutes (cl.43), and the range of temperature and concentration dopant of the first and second silicon layer (cl. 44-47).

Thakur also disclose:

-Re. claims 43 & 44-47: converting comprises silane and annealed the seeded in range of 450 C – 700 C degrees, under 10-20 millitorr, by rapid thermal CVD (col.4, lines 29-31, col. 5, lines 3-22, col. 6, lines 10-14, and col. 7, lines 17-31), and the range

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of temperature and concentration dopant of the first silicon layer and the second silicon layer are about 450 C – 525 C degrees and 10⁻³ Torr to 10⁻¹ Torr.

With respect to claims 43-47 the range of time, temperature and concentration dopant are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art, As noted In re Aller 105 USPQ233, 255 (CCPA 1955)., the selection of reaction parameters such as temperature and concentration would have been obvious.

"Normally, it is to be expected that a change in temperature, or in range, concentration, cycles, thickness, would be an unpatentable modification. Under some circumstance, however, changes such as these may be impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality ... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller 105 USPQ233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmscher 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Response to Arguments

Applicant's arguments filed on 3/12/03 have been considered but they are not persuavive. The recited limitation "exposed" is a new issue.

Applicant's argument that Al-Shareef and Thakur fail to disclose:

1) An exposed inner periphery defined by a second silicon containing layer and exposed outer periphery defined by a first silicon containing layer, which is more heavily doped than the second silicon containing layer.

Al-Shareef and Thakur also do not indicate an inner and outer periphery defined by a second and first silicon containing layer , but they disclose a DRAM is composed of

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a peripheral circuitry (col.1, lines 12-16) and showing an exposed inner and outer periphery defined by an undoped silicon containing layer 108/104 and doped silicon containing layer 106 (fig. 1G).

However, Deboer et al. (6,451,661B1) disclose exposed inner periphery defined by a second silicon containing layer 153, and exposed outer periphery defined by a first silicon containing layer 152, which is more heavily doped than the second silicon containing layer (col.5 & 6, lines 56-34, fig. 14).

2) The different HSG sizes between the first and second silicon containing layer .

Thakur discloses the seeding, grain size, and lower or higher rugged surface can be controlled by gas processing, concentration of dopant, and selecting of any order of mixing ingredients (col. 3 & 4, lines 65-19). It would be obvious to one of ordinary skill in the art that there various application and modification can be made to form the different grain sizes in a structure (Wu 's 6,274,428B1, col.5, lines 28-33).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yennhu Huynh whose telephone number is (703)308-6110. The examiner can normally be reached on Monday-Friday from 8:00 AM to 4.30PM.

If attempts to reach the examiner by telephone are unsuccessfully, the examiner's supervisor, Carl Whitehead, Jr., can be reached on (703) 308-4940. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

YNBH,
5/28/03


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800